

PATENT APPLICATION

VEHICLE DUMP BODY ELEVATION DEVICE, KIT, AND METHOD RELATING THERETO

FIELD OF THE INVENTION

5 The present invention relates to an aftermarket kit and method for modifying a pickup truck into a dump truck without impairing the structural integrity of the vehicle. In particular, the present invention employs a novel scissor hoist and hinge combination.

10 BACKGROUND OF THE INVENTION

A number of systems currently exist for converting a pickup truck to a dump truck. A typical conversion kit employs a hinge to pivot the rear of the truck bed on the truck frame and an under body hoist to tilt the front of the truck bed to the dumping position. However, installation of these kits requires vehicle alteration which complicates installation and negatively impacts the safety and towing capacity of the altered truck.

U.S. 6,561,589 to Jones describes a dump truck hinge wherein the raising and lowering operation pivots the bed about a rear hinge connected in conventional fashion at and between the rear ends of the frame members. When this configuration is used to pivot a pickup truck bed, the hinge causes the tailgate to interfere with frame mounted equipment such as the exhaust system, spare tire carrier, rear bumper, tow hitch, and receivers. Thus, to convert the truck using this configuration, the frame mounted equipment must be removed completely or modified. Such modifications add considerable expense to dump truck conversions, lessen or eliminate the vehicle's towing capacity, and interfere with the aesthetic appearance of the truck itself.

Rather than discard the bumper, some conversions weld, or otherwise attach the bumper to the truck bed. U.S. 4,019,781 to Ray provides hinges that are fixedly attached to the underside of the hauling bed adapted for rotatable engagement with the

rear of the truck frame. Extensions extending from the bumper are trimmed and, as so modified, are fixedly attached to hinge plate members. In this way, the bumper rotates with the hinge plate members as the bed is tilted. While this configuration provides a method of mounting the rear bumper, no provision is made to prevent the bumper or tailgate from interfering with the tow hitch and/or receivers. Furthermore, towing capacity and crash protection are limited by such bumper mounting modifications, hinges, hinge mounting, and hoist mechanisms as described by Ray.

When converting a pickup truck to a dump truck, space considerations make it impractical to use a separate hoist to elevate the rear of the dump body over the rear bumper and accessories. Other known methods of elevating the rear of a dump body are likewise not practical for pickup truck conversions. For example, U.S. 5,513,901 to Smith et al. describes a hoist mechanism having a moving instant center of body rotation. As the lift progresses a back link raises the rearward end of the dump body. In a short-body version of the apparatus, a forward transverse member is moved rearwardly toward the intermediate transverse member, shortening the hoist subframe. The hoist mechanism is preferably constructed with a mounting height of twelve inches. This raises the bed of a pickup truck higher than the cab when the bed is positioned in the lowered position and is aesthetically unappealing. In addition, because of space limitations, the short-body version requires more space than is available on a short bed pickup truck and thus is not feasible.

An object of the present invention is to provide a dump truck elevation device that can be installed on a pickup truck without alteration of the vehicle frame, rear bumper, bumper mounts, spare tire carrier, towing hitches or receivers, while preserving the aesthetic appearance of the truck itself.

Another object of the present invention is to provide a dump truck elevation device that permits dumping over the vehicle's bumper and other frame mounted accessories.

Another object of the present invention is to provide a dump truck elevation device that is easy to install.

SUMMARY OF THE INVENTION

5 The present invention is directed toward a vehicle dump body elevation device comprising at least one hinge assembly for attaching a dump body to a vehicle frame. The hinge assembly has a lowered position wherein the dump body is substantially horizontal and a raised position wherein a front portion of the dump body is elevated higher than a rear portion of the dump body. The rear portion of the
10 dump body is elevated clear of a rear bumper mounted on the vehicle frame. The hinge assembly moves both the front and the rear portions of the dump body upwardly while pivoting the dump body to the raised position. The device also comprises at least one hoist having a lower end pivotally attached to the vehicle frame and an upper end pivotally attached to the dump body.

15 The invention further embodies a kit for modifying a vehicle to function as a dump truck. The kit comprises at least one hinge assembly to move a dump body between a lowered position, wherein the dump body is substantially horizontal, and a raised position, wherein a front portion of the dump body is elevated higher than a rear portion of the dump body. The rear portion of the dump body is elevated clear of
20 a rear bumper mounted on a vehicle frame. The hinge assembly moves both the front and the rear portions of the dump body upwardly, while pivoting the dump body to the angled position. The kit further includes at least one hoist having a first means for pivotal attachment to the vehicle frame and a second means for pivotal attachment to the dump body.

25 Another embodiment of the invention is a method of converting a vehicle from a fixed bed vehicle to a dump truck. In practicing the method, a fixed bed is removed from a vehicle. A vehicle dump body elevation device comprising at least one hinge assembly is provided. The hinge assembly moves a dump body between a lowered

position, wherein the dump body is substantially horizontal, and a raised position, wherein a front portion of the dump body is elevated higher than a rear portion of the dump body. The rear portion of the dump body is elevated clear of a rear bumper mounted on the vehicle frame. The hinge assembly moves both the front and the rear portions of the dump body upwardly, while pivoting the dump body to the raised position. The vehicle dump body elevation device also comprises at least one hoist having a first means for pivotal attachment to a vehicle frame and a second means for pivotal attachment to the dump body. The hinge assembly and the hoist are mounted to the vehicle frame and the dump body.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate a complete embodiment of the invention according to the best modes so far devised for the practical application of the principles thereof, and in which:

FIG. 1 depicts the vehicle dump body elevation device of the present invention.

FIG. 2 depicts the vehicle dump body in the raised position.

FIG. 3 is a schematic view of the hinge assembly.

FIG. 4 is a schematic view of the scissor hoist mechanism in the closed position.

FIG. 5 is a schematic view of the scissor hoist mechanism in the open position.

FIG. 6 is a schematic view of the channeled hinge.

FIG. 7 is a schematic view of the hydraulic system.

To simplify the reading of this specification, the following numbers correspond to the elements listed below:

10 Vehicle Dump Body Elevation Device

20 Hinge Assembly

	25	First Hinge Assembly
	27	Second Hinge Assembly
	28	Torsion Bar
	30	Dump Body
5	32	Underside of Dump Body
	33	Front Portion of Dump Body
	35	Rear Portion of Dump Body
	37	Tail gate
	40	Rear Bumper
10	50	Hoist
	55	Hoist Lower End
	57	Hoist Upper End
	60	Vehicle Frame
	70	Front Link Member
15	80	Main Link Member
	85	Main Link Member First End
	87	Main Link Member Second End
	90	Main Link Member Attachment Means
	100	Rear Link Member
20	105	Rear Link Member First End
	107	Rear Link Member Second End
	110	Center Linking Member
	112	Center Linking Member First End
	114	Center Linking Member Second End
25	115	Center Linking Member Mounting Means
	120	Scissor Hoist Mechanism
	130	Channeled Hinge
	131a	Safety Pin Active Hole

- 131b** Safety Pin Active Hole
- 132** First Upwardly Extending End of Channeled Hinge
- 133** Lower Pivot Pins
- 134** Lower Pivot Pins
- 5 **135** Second Upwardly Extending End of Channeled Hinge
- 136a** Safety Pin Storage Holes
- 136b** Safety Pin Storage Holes
- 137** Space defined by First and Second Upwardly Extending Ends of Channeled Hinge
- 10 **138** Upper Pivot Pins
- 139** Upper Pivot Pins
- 140** Safety Pin
- 142** Two Lower Scissor Arms
- 144** Two Lower Scissor Arms
- 15 **143** Lower Scissor Arms First End
- 145** Lower Scissor Arms First End
- 147** Two Lower Scissor Arms Second End
- 149** Two Lower Scissor Arms Second End
- 152** Two Upper Scissor Arms
- 20 **154** Two Upper Scissor Arms
- 153** Upper Scissor Arms First End
- 155** Upper Scissor Arms First End
- 157** Upper Scissor Arms Second End
- 159** Upper Scissor Arms Second End
- 25 **160** Lifting Means
- 161** Lifting Means Extending Member
- 165** Lifting Means Base End
- 167** Lifting Means Extending End

170 Pivot Block Means
180 Hydraulic System
185 Hydraulic Cylinder
187 Air Vent
5 **190** Low Pressure Hose
192 First End of Low Pressure Hose
194 Second End of Low Pressure Hose
195 Reservoir
200 High Pressure Hose
10 **220** Valve Assembly

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, where similar elements are numbered the same, Figure 1 depicts the vehicle dump body elevation device **10** of the present invention. The invention comprises at least one hinge assembly **20**. The hinge assembly **20** has a lowered position wherein the dump body (not shown) is substantially horizontal and a raised position wherein a front portion of the dump body is elevated higher than a rear portion of the dump body (Figure 2). As shown in Figure 2, during the operation of the hinge assembly **20**, the rear portion **35** of the dump body **30** is elevated clear of a rear bumper **40** mounted on the vehicle frame **60**. The hinge assembly **20** moves both the front **33** and the rear portions **35** of the dump body **30** upwardly while pivoting the dump body **30** to the raised position. Enough clearance is maintained between the rear portion **35** of the dump body **30** and the rear bumper **40** to allow operation with a tailgate **37** in a lowered position. The lowered tailgate **37** dumps over the rear bumper **40** tow hitch and receivers (not shown). Referring back to Figure 1, the device **10** also comprises at least one hoist **50** having a lower end **55** pivotally attached to the vehicle frame **60** and an upper end **57** pivotally attached to the dump body (not shown).

Figure 3 depicts the hinge assembly **20**. The hinge assembly **20** further comprises a front link member **70** pivotally mounted to the dump body (not shown). A main link member **80** has a first end **85** pivotally attached to the front link member **70**. A second end **87** is pivotally mounted to a vehicle frame **60**. An attachment means **90** is disposed therebetween for pivotal attachment to a rear link member **100**. The rear link member **100** has a first end **105** pivotally mounted to the dump body (not shown). A second end **107** is pivotally attached to a center linking member **110**. A first end **112** of the center linking member **110** has a mounting means **115** for attachment to the vehicle frame.

In a preferred embodiment, the rear link member **100** is pivotally attached to the attachment means **90** of the main link member **80** near the center of the rear link member **100**. The attachment means **90** may be any means known to those of skill in the art. Preferably, the attachment means **90** is a pivot mount fixedly attached to the main link member **80**.

In an alternative embodiment of the invention, as shown in Figure 1, at least one hoist **50** is disposed between a first hinge assembly **25** and a second hinge assembly **27**. Although only one hoist is depicted in the figure, more than one hoist may be employed in practicing the present invention. To prevent twisting of the dump body (not shown), a torsion bar **28** is disposed between and attached to the first hinge assembly **25** and the second hinge assembly **27**. The torsion bar **28** keeps the first hinge assembly **25** and the second hinge assembly **27** working in unison. As shown in Figure 2, the front link members **70** are pivotally mounted to an underside **32** of the dump body **30**. The first end **112** of the center linking member **110** is pivotally mounted to the vehicle frame **60**, and a second end **114** of the center linking member **110** is pivotally attached to the rear link member **100**. Referring back to Figure 1, the rear link member **100** is pivotally attached to the attachment means **90** of the main link member **80** near the center of the rear link member **100**. The attachment means **90** may be any means known to those of skill in the art, and preferably is a

pivot mount fixedly attached to the main link member **80**.

The hoist **50** of the present invention may be any hoist known to those of skill in the art, but preferably comprises a scissor hoist mechanism **120** (Figures 4 and 5). The scissor hoist mechanism **120** comprises a channeled hinge **130** (Figure 6) having
5 a first upwardly extending end **132** and a second upwardly extending end **135** defining a space **137** therebetween. Referring back to Figures 4 and 5, each upwardly extending end **132**, **135** has an upper pivot pin **138**, **139** and a lower pivot pin **133**, **134** extending outwardly therefrom. Two lower scissor arms **142**, **144** each have a first end **143**, **145** pivotally attached to a lower pivot pin **133**, **134** and a second end
10 **147**, **149** pivotally attached to the vehicle frame (not shown). Two upper scissor arms **152**, **154** each comprise a first end **153**, **155** pivotally attached to an upper pivot pin **138**, **139** and a second end **157**, **159** pivotally attached to the dump body (not shown). The hoist also has a lifting means **160** for moving the scissor hoist mechanism **120** from a closed position to an open position. The lifting means **160** is disposed between
15 the lower scissor arms **142**, **144** and the upper scissor arms **152**, **154**. The lifting means **160** comprises a base end **165** pivotally attached to the lower scissor arms **142**, **144** and an extending end **167** pivotally attached to the upper scissor arms **152**, **154**. Any means for pivotal attachment known to those of skill in the art may be used.

In a preferred embodiment of the invention, each second end of each upper
20 scissor arm **157**, **159** is pivotally attached to the underside of the dump body (not shown). At least one lower pivot pin **133**, **134** extends beyond the corresponding lower scissor arm **142**, **144**. At least one upper scissor arm **152**, **154** comprises a pivot block means **170** fixedly attached thereto. The pivot block means **170** selectively pivots the two upper scissor arms **152**, **154** and the two lower scissor arms
25 **142**, **144** about the upper pivot pins **138**, **139** and the lower pivot pins **133**, **134**. The pivot block means **170** maximizes the force exerted by the lifting means **160** by causing the upper scissor arms **152**, **154** to rotate about the upper pivot pins **138**, **139** before the lower scissor arms **142**, **144** rotate about the lower pivot pins **133**, **134**.

The lifting means **160** has an extended position wherein an extending member **161** is disposed within the space **137** (Figure 6) defined by the upwardly extending ends **132**, **135** of the channeled hinge **130**. Referring back to Figures 4 and 5, the extended position of the lifting means **160** orients the upper scissor arms **152**, **154** at an angle of about 180 degrees in relationship to the lower scissor arms **142**, **144** and reduces the size requirement of the scissor hoist mechanism that is needed to achieve an appropriate lift height. This size reduction allows installation of the scissor hoist mechanism **120** on short bed pickup trucks, something that was unachievable based on the mechanisms described in the prior art.

Any lifting means **160** may be used in the present invention. However, preferably the lifting means **160** is a hydraulic cylinder. The hydraulic cylinder may be any hydraulic cylinder known to those of skill in the art. Preferably, the hydraulic cylinder is a single acting hydraulic cylinder that has the capability to extend beyond that which is needed to fully open the scissor hoist mechanism **120**. The resulting force on the opened scissor hoist mechanism **120** stabilizes the elevated dump body (not shown) by compensating for wear to the hydraulic cylinder **160**, and other components of the scissor hoist mechanism **120**.

Figures 4 and 7 illustrate a most preferred embodiment of the invention with respect to a hydraulic system **180**. As the dump body (not shown) is being elevated, a hydraulic pump (not shown) supplies hydraulic fluid from a reservoir **195** through a high pressure hose **200** to a hydraulic cylinder **185**. As the dump body (not shown) is being lowered, hydraulic fluid moves from the hydraulic cylinder **185** through a high pressure hose **200** and back to the reservoir **195**. The high pressure hose **200** comprises an integral valve assembly **220** which provides free flow of hydraulic fluid as the dump body is being elevated, and controls the flow of hydraulic fluid as the dump body is being lowered. This allows a dump truck operator to regulate the rate of hydraulic fluid escape from the hydraulic cylinder **185** to prevent the weight of any material left in the dump body from forcing the bed to drop at an uncontrolled rate of

speed. Alternatively, the valve assembly **220** may regulate hydraulic fluid flow for both raising and lowering the dump body.

5 A low pressure hose **190** has a first end **192** attached to an air vent **187** disposed in the hydraulic cylinder **185**. The hydraulic cylinder **185** is vented through the low pressure hose **190** and outward through a second end **194** of the low pressure hose **190** into the reservoir **195**. The low pressure hose **190** recycles leaked hydraulic fluid to the reservoir **195**.

10 Referring to Figures 4, 5 and 6, the channeled hinge, **130** further comprises at least one safety pin **140** for securing the scissored hoist mechanism **120** in the open position. The safety pin **140** is stored in any location that does not interfere with operation of the scissored hoist mechanism **120**. A possible storage location is through a set of holes **136a**, **136b** in the first and second upwardly extending ends **132**, **135** of the channeled hinge **130**. When the dump body (not shown) is elevated, the safety pin **140** is removed from the storage location **136a**, **136b** and inserted through active
15 location holes **131a**, **131b**. This secures the dump body (not shown) in the elevated position by retaining the extending member **161** of the lifting means **160** within the space **137** defined by the upwardly extending ends **132**, **135** of the channeled hinge **130**. Alternatively, one of ordinary skill in the art can identify other active safety pin locations to secure the dump body (not shown) in the elevated position by locking the
20 upper scissor arms **152**, **154** to the lower scissor arms **142**, **144**, or locking the upper scissor arms **152**, **154**, lower scissor arms **142**, **144**, and channeled hinge **130** together. Securing the dump body (not shown) in the elevated position is useful to prevent accidentally lowering while the vehicle is being serviced.

25 The invention further comprises a kit for modifying a vehicle to function as a dump truck. The kit comprises at least one hinge assembly to move a dump body between a lowered position, wherein the dump body is substantially horizontal, and a raised position, wherein a front portion of the dump body is elevated higher than a rear portion of the dump body. The rear portion of the dump body is elevated clear of a

rear bumper mounted on a vehicle frame. The hinge assembly moves both the front and the rear portions of the dump body upwardly, while pivoting the dump body to the angled position. The kit further includes at least one hoist having a first means for pivotal attachment to the vehicle frame and a second means for pivotal attachment to the dump body.

In practicing the method of the present invention, a fixed bed is removed from a vehicle. A vehicle dump body elevation device comprising at least one hinge assembly is provided. The hinge assembly moves a dump body between a lowered position, wherein the dump body is substantially horizontal, and a raised position, wherein a front portion of the dump body is elevated higher than a rear portion of the dump body. The rear portion of the dump body is elevated clear of a rear bumper mounted on the vehicle frame. The hinge assembly moves both the front and the rear portions of the dump body upwardly, while pivoting the dump body to the raised position. The vehicle dump body elevation device also comprises at least one hoist having a first means for pivotal attachment to a vehicle frame and a second means for pivotal attachment to the dump body. The hinge assembly and the hoist are mounted to the vehicle frame and the dump body.

In a preferred embodiment of the invention, the hinge assembly is pivotally mounted to the vehicle frame. In addition, the hoist is pivotally mounted to the vehicle frame. The hinge assembly and the hoist are pivotally mounted to the underside of the dump body.

The method of the present invention does not require cutting, welding, removal or modification of a vehicle's original bumper, frame, trailer hitch, spare tire or exhaust system. This reduces labor cost for installation and does not alter the towing capacity or structural integrity of the vehicle. Raising the rear of the elevated dump body also increases the distance between the tailgate and the ground which facilitates complete dumping of the dump body's contents.

The above description and drawings are only illustrative of preferred embodiments which achieve the objects, features and advantages of the present invention, and it is not intended that the present invention be limited thereto. Any modification of the present invention which comes within the spirit and scope of the following claims is considered part of the present invention.

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